

What is Parkfield?

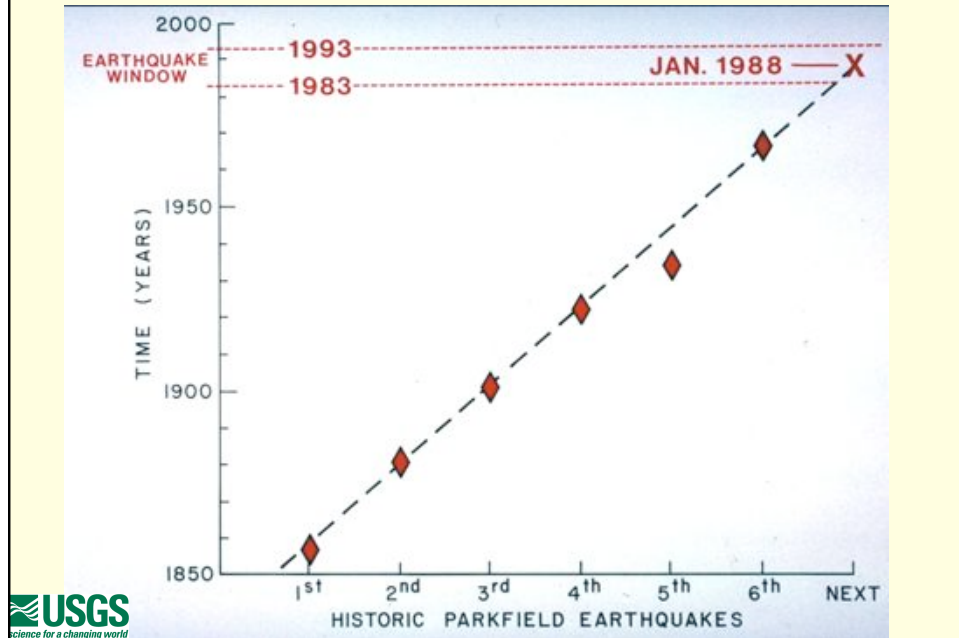
A tiny cow town.

Home of the Parkfield Earthquake Prediction Experiment: a project involving 100s of people for decades that has produced about 800 publications.

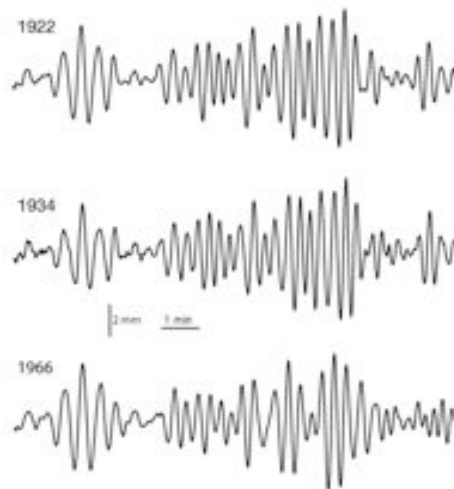
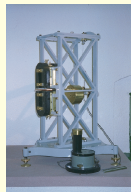
A major battleground over earthquake prediction and between the concepts of repeatability and variability.



Early 1980's view: the prediction

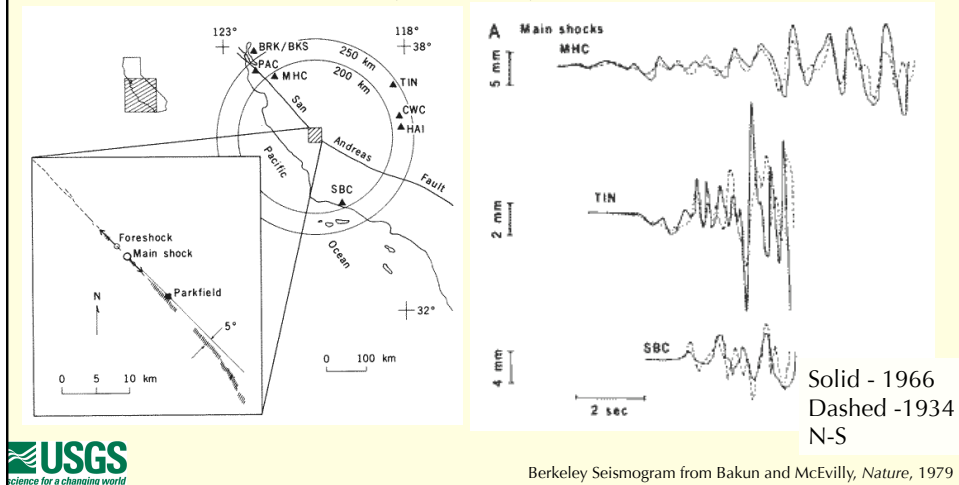


Early 1980's view: Seismograms from the Netherlands imply similar events



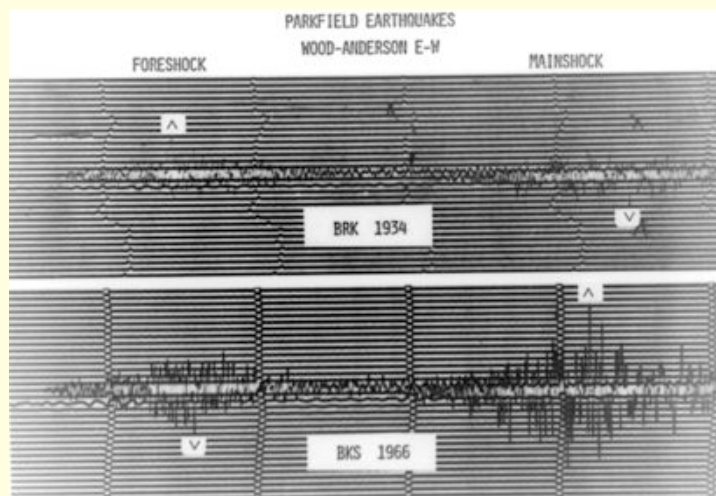
Debilt Seismograms from Dost at KNMI

Early 1980's view:
Seismograms Berkeley imply
similar hypocenters (starting points)
for 1922, 1934, and 1966.



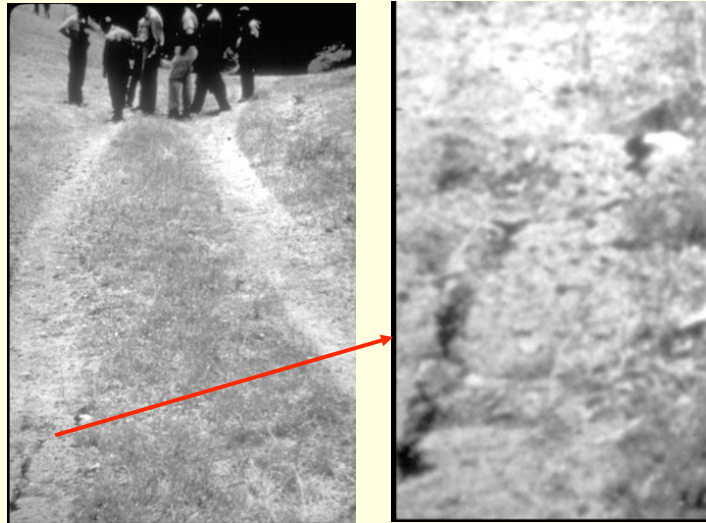
Early 80's view: possible precursors

Seismograms from Berkeley show that there was an M5 foreshock
17 minutes before the main shock.



Early 80's view: possible precursors

Surface cracking about 2 weeks before the 1966 mainshock?



Early 80's view: possible precursors

Fault Creep 9 hours before 1966 mainshock breaks a pipe?



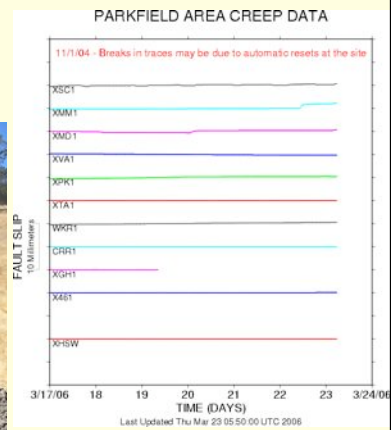
Building an experiment



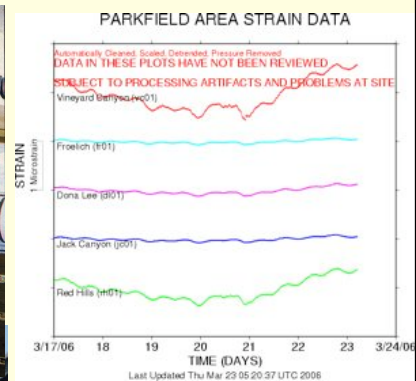
Seismic Networks



Creepmeters



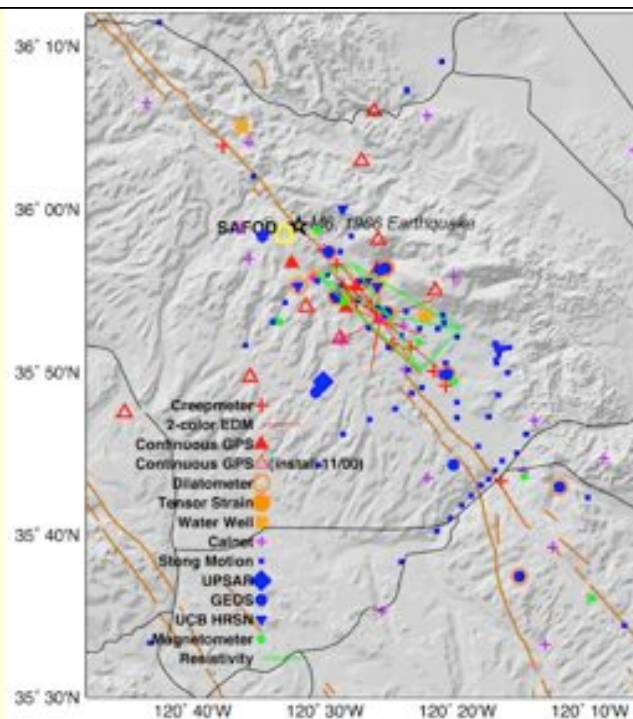
Strainmeters



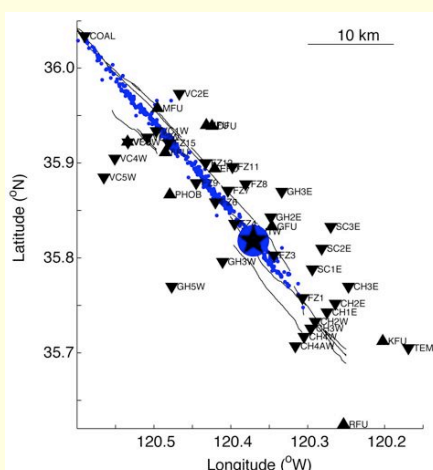
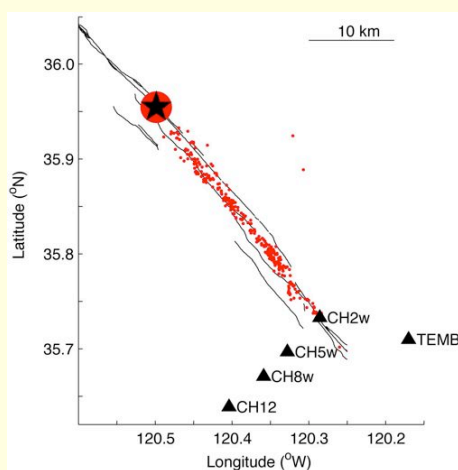
The 2-color laser on Carr Hill



Parkfield Monitoring Sites

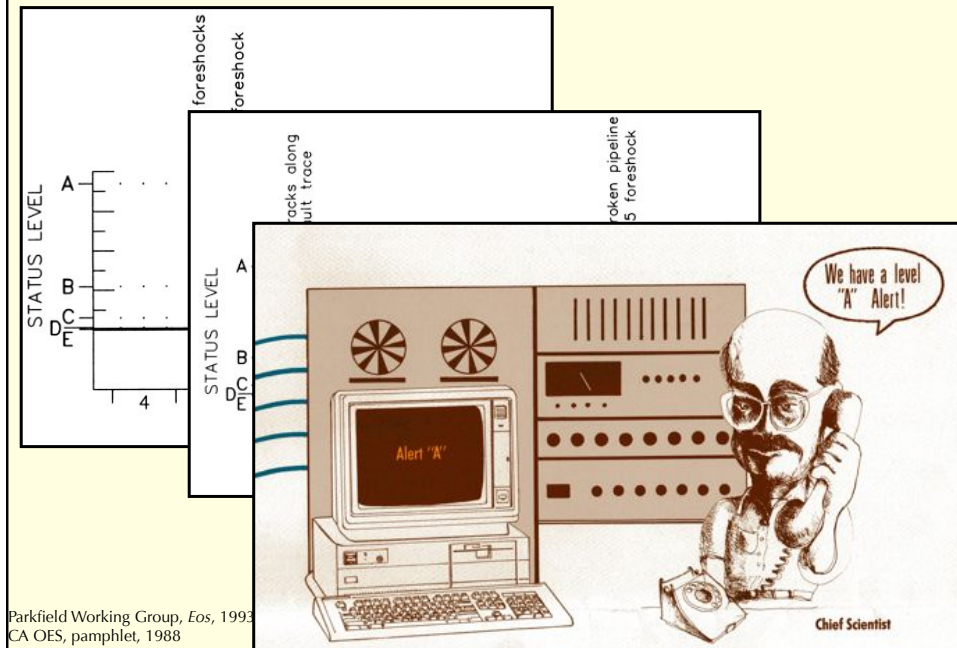


Strong Motion Records: 1966 vs. 2004

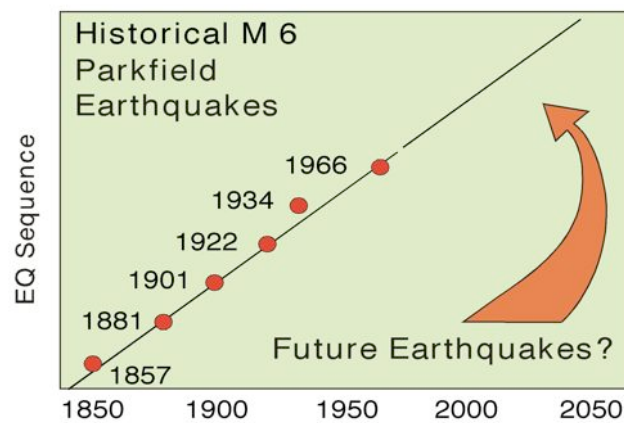


From Susana Custodio, UCSB
and Liu et al., *BSSA*, in press.

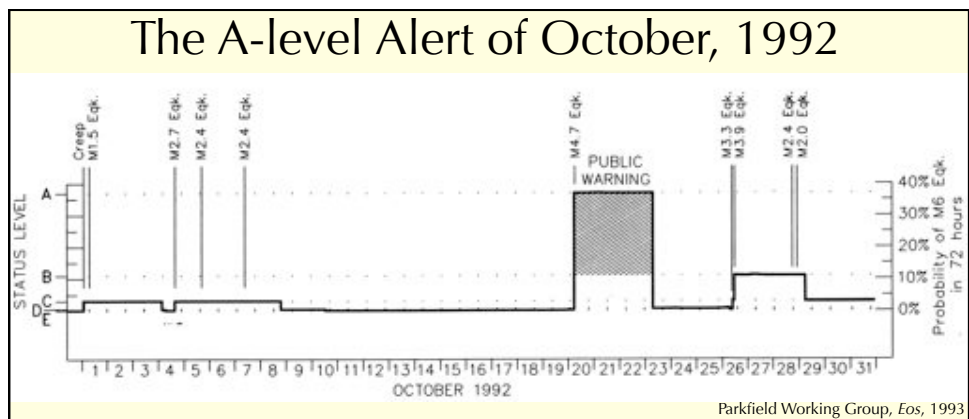
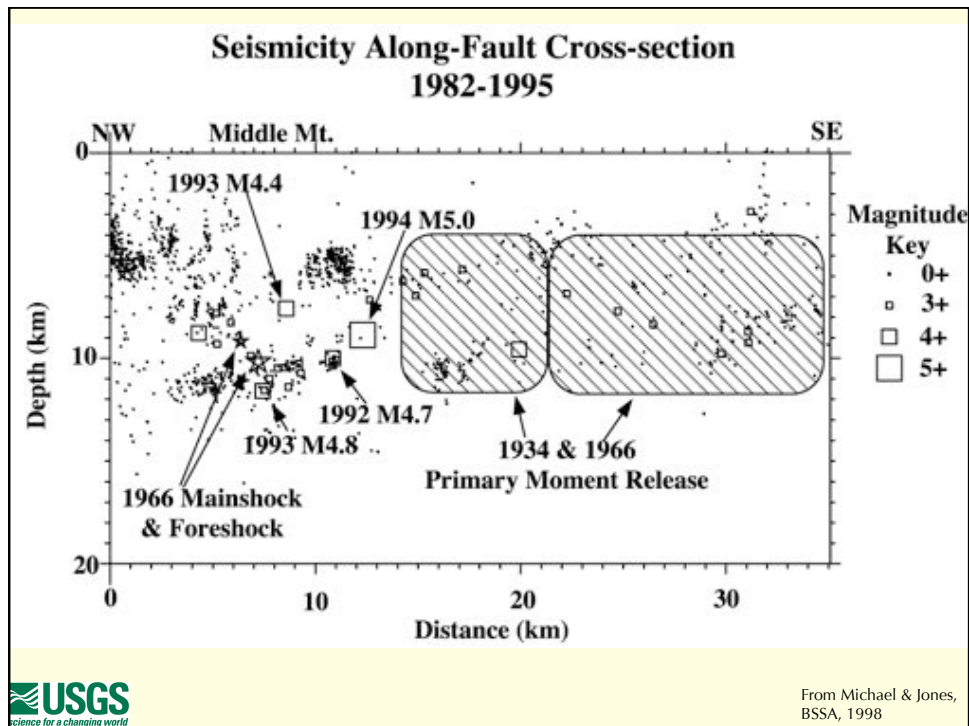
Devising an alert scheme



And then you wait.....



"Parkfield remains the best identified locale to trap an earthquake." – Hager Committee Report (1994) to the National Earthquake Prediction Evaluation Council



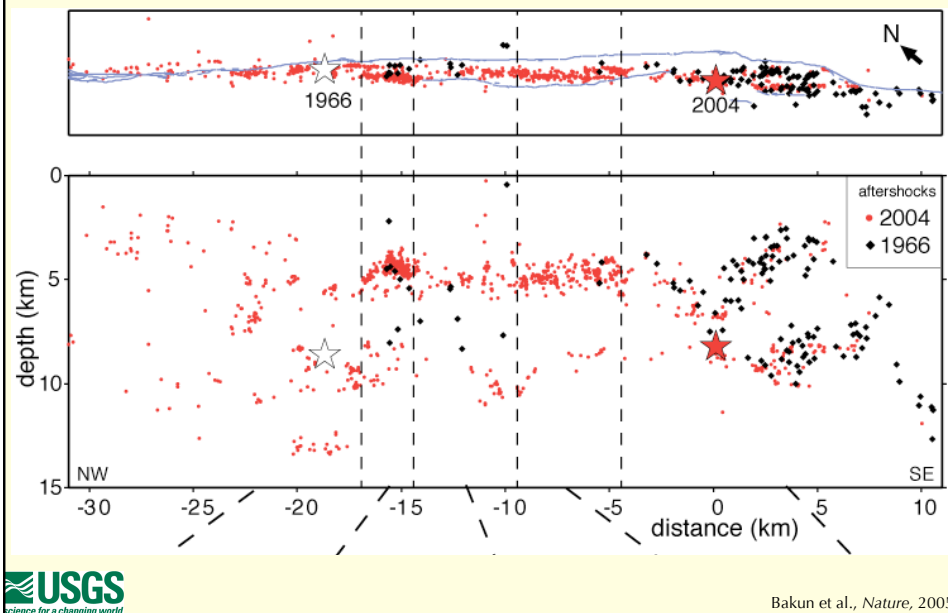
Lessons from running the alert system:

- Bridging the gap from science to action
- Communicating to the public: say who isn't at risk
- When not to communicate
- The problem of communicating probabilities: KISS vs. truth
- The role of the media
- The importance of plans to overcome inertia and doubt



Some lessons from Fitzpatrick et al., 1992

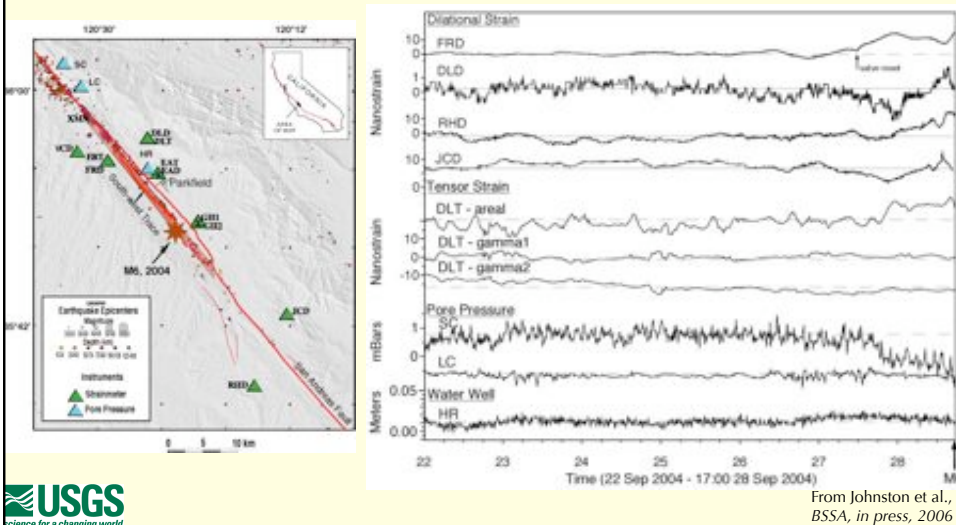
And then, on September, 28, 2004



Were there precursors in 2004?

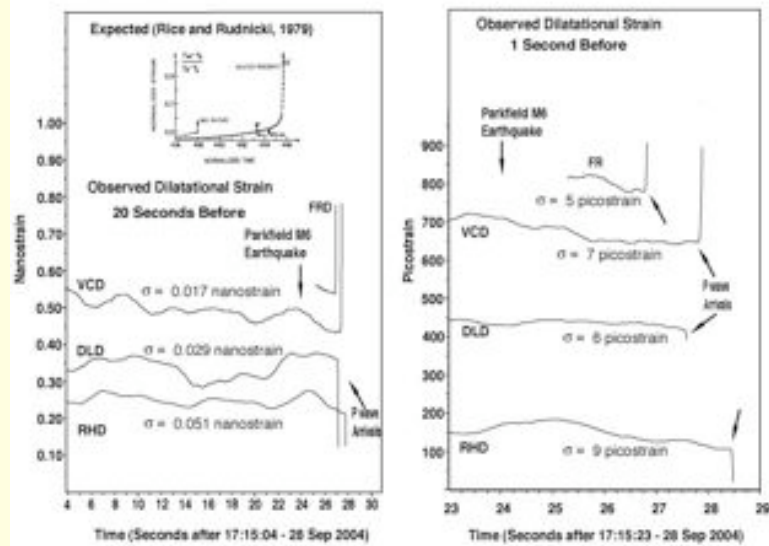
Strain changes prior to 2004 Parkfield Earthquake?

Statistically insignificant and
not compatible with slip at the hypocenter.



Were there precursors in 2004?

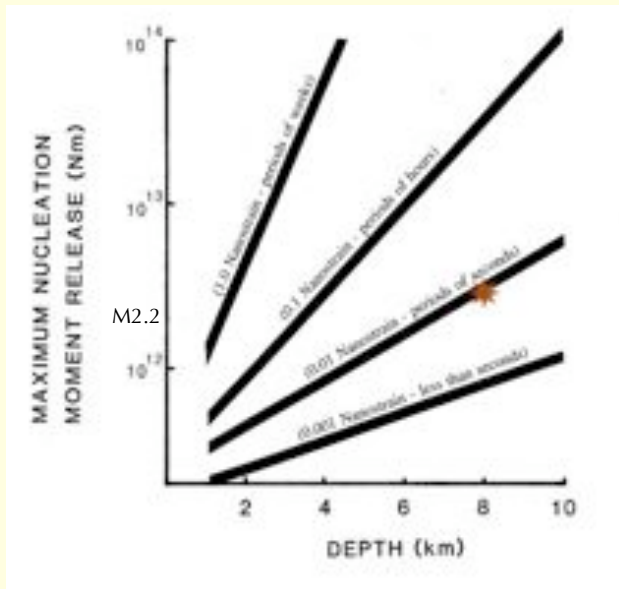
Strain changes prior to 2004 Parkfield Earthquake?



From Johnston et al.,
BSSA, in press, 2006

Were there precursors in 2004?

Strain changes prior to 2004 Parkfield Earthquake?



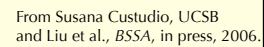
From Johnston et al.,
BSSA, in press, 2006

Geodetic Models

Estimated slip in 1934 earthquake

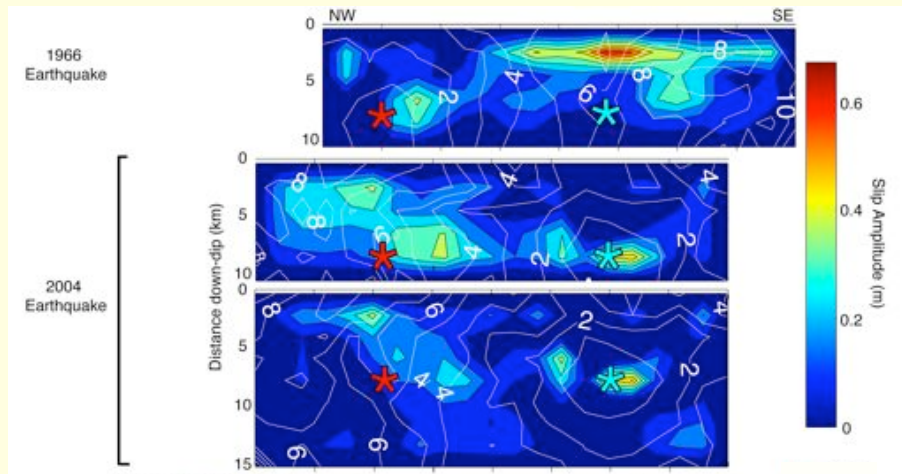


Seismic Models



Slip in 1966 and 2004

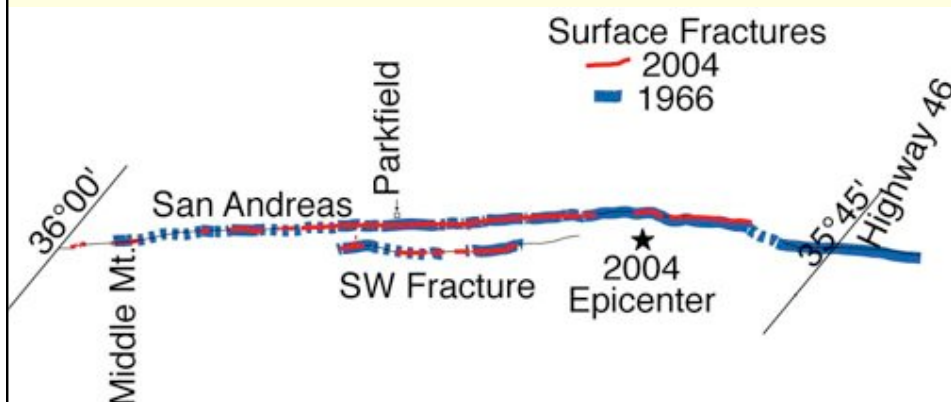
Seismic Models



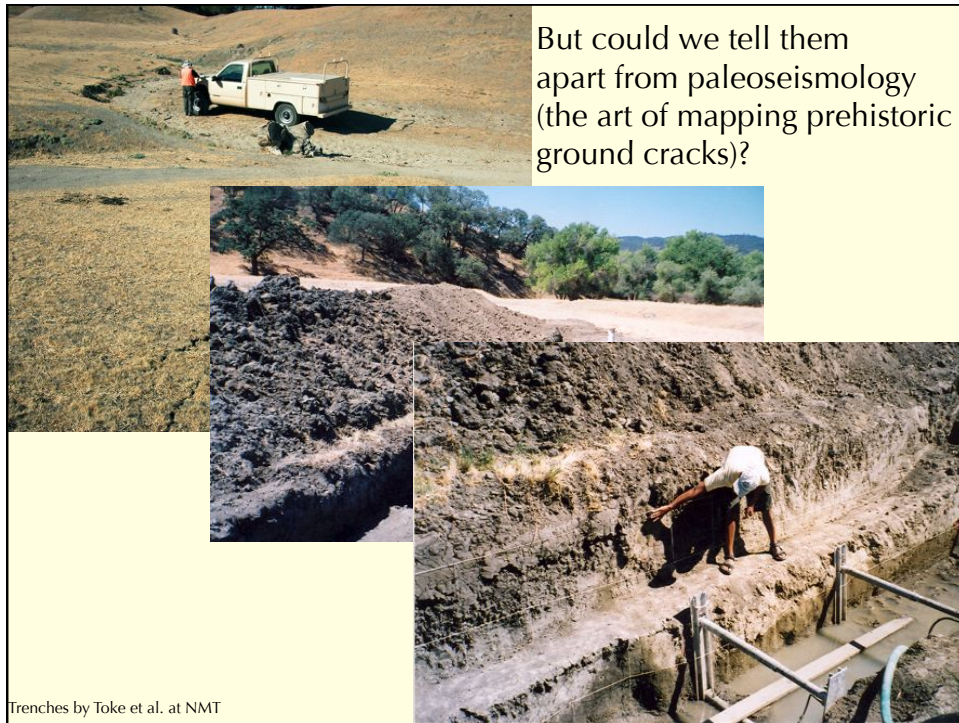
From Susana Custodio, UCSB
and Liu et al., *BSSA*, in press, 2006.

Could we tell the 1966 and 2004 earthquakes apart from geology?

Geologic Slip in 1966 and 2004 is a little different.

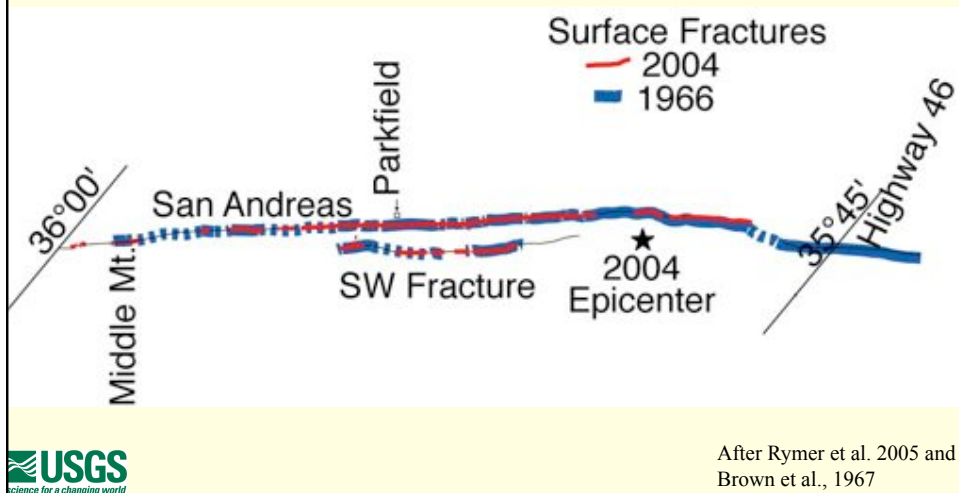


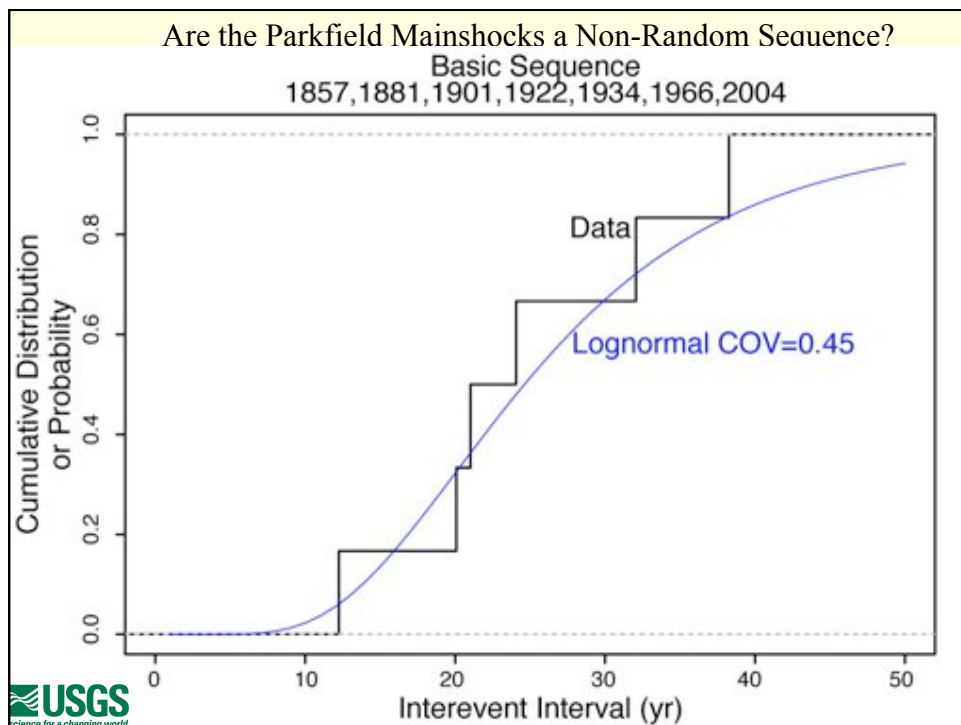
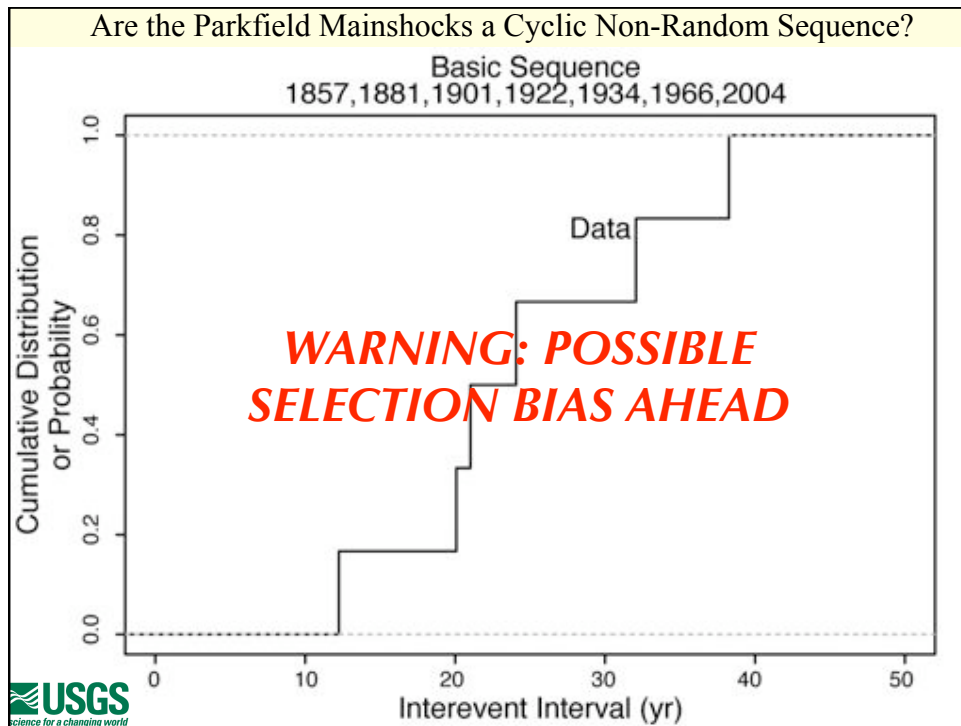
After Rymer et al. 2004 and
Brown et al., 1967

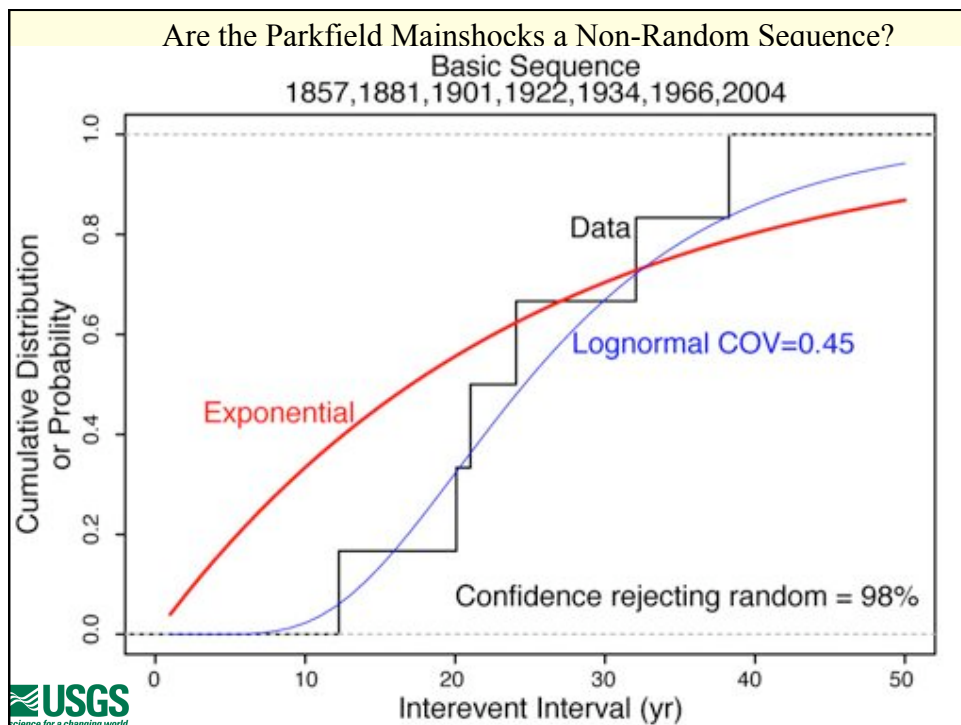
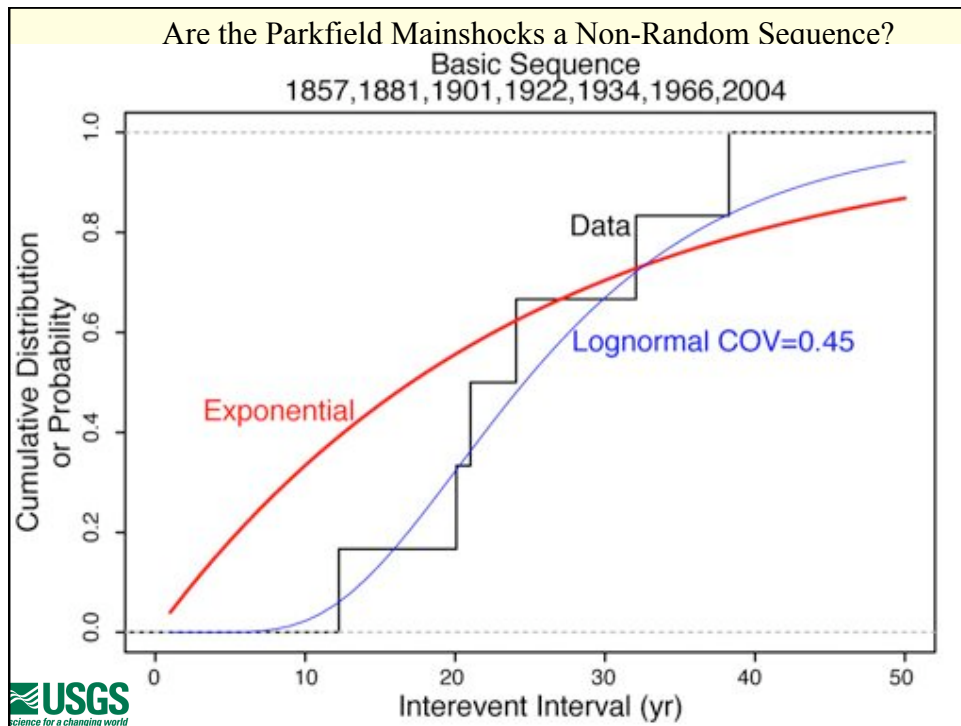


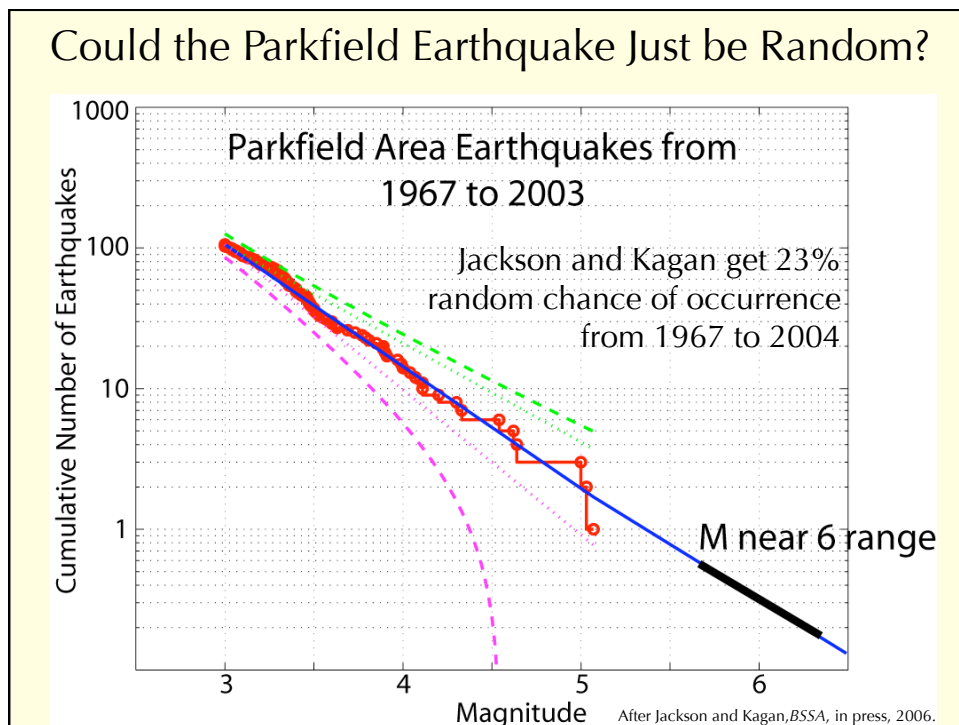
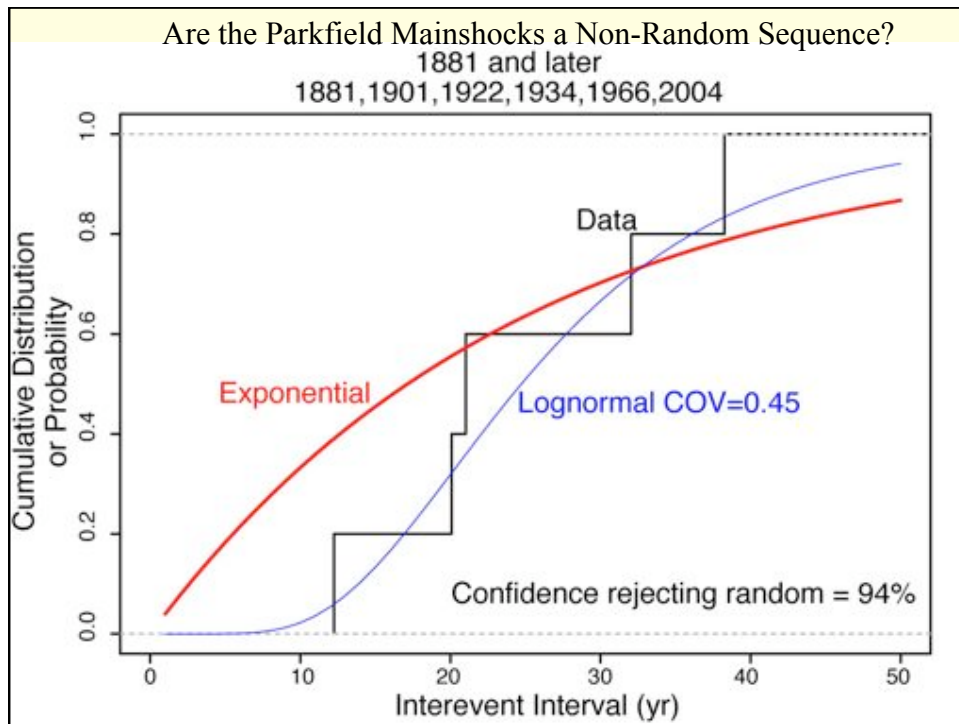
Could you tell them apart if you got to only look for cracks in 2 places?

If not, can paleoseismology tell us much about the details of earthquake repeatability and variability?

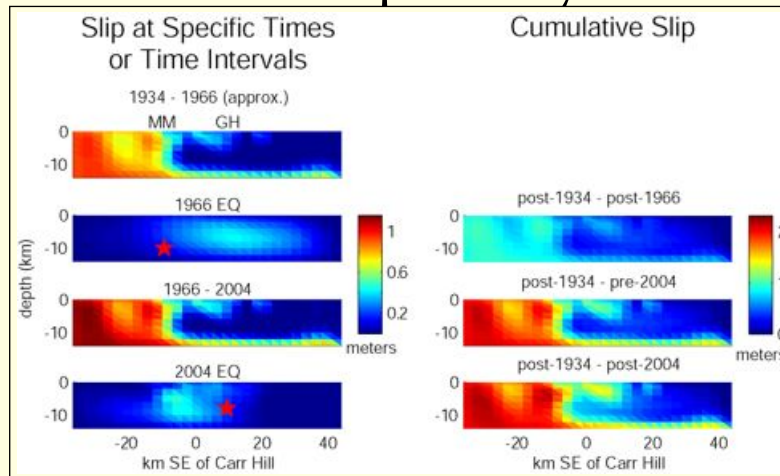






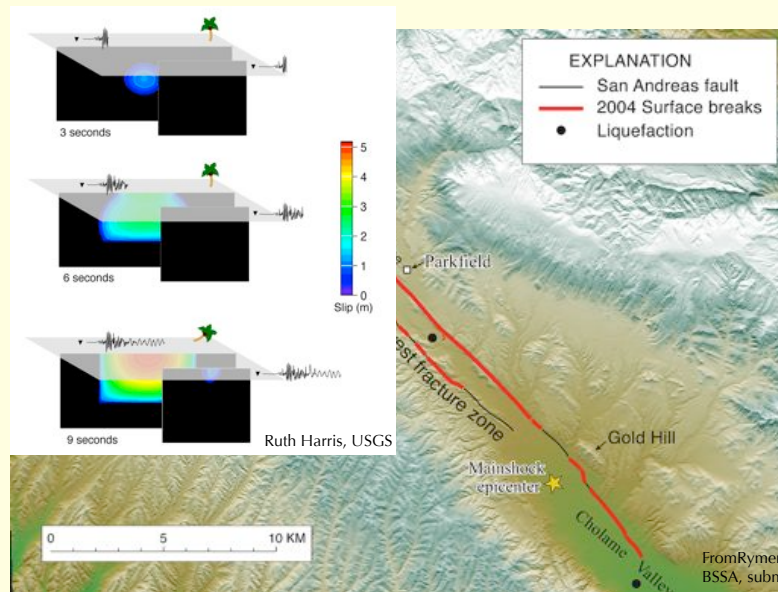


Accumulated slip over two earthquake cycles

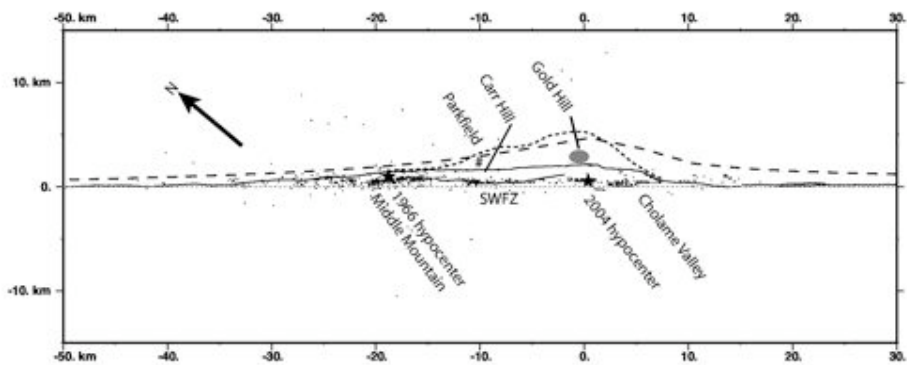


Murray and Langbein, BSSA, in press, 2006.

Are Parkfield Earthquakes Trapped Between the Creeping Segment and Cholame Valley

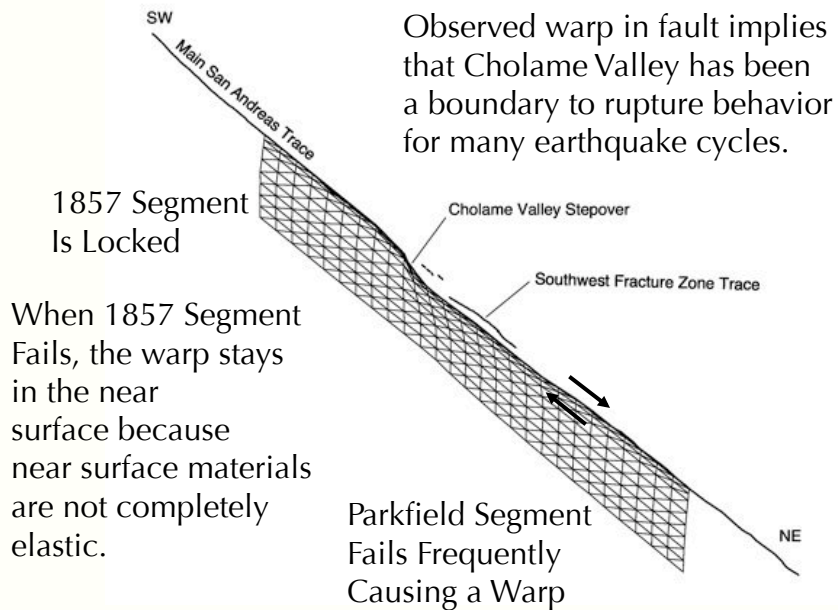


But there is no fault bend, jog, or stepover at the depths where earthquakes happen.



From Simpson et al., *BSSA*, in press, 2006.

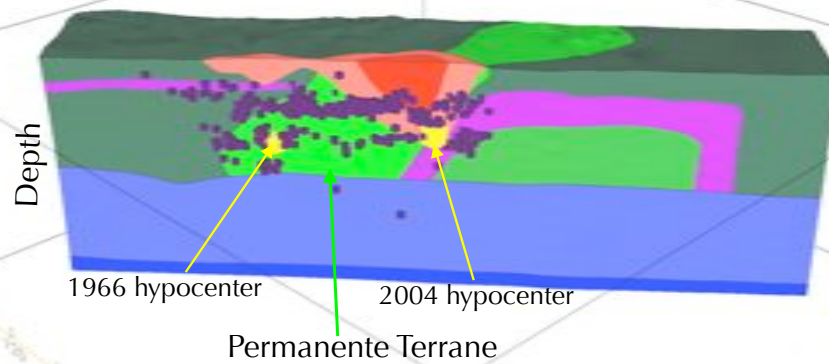
Simpson et al. Model:



From Simpson et al., *BSSA*, in press, 2006.

Geologic Controls on Rupture?

View of NE side of San Andreas Fault



Bob Jachens based on geologic mapping, gravity, magnetics, and 3D seismic velocity models.

WAITING FOR THE BIG ONE

by Heather Millar

